Washington University in St. Louis

Bachelor of Science in Mechanical Engineering

The mission of the undergraduate program in mechanical engineering is to prepare students within the broad and evolving field of mechanical engineering. The program instills in students a capacity for creative design through critical and analytical thought. The Bachelor of Science in Mechanical Engineering (BSME) is the first step toward a career in industry, academia or government; it encourages a commitment to independent lifelong learning and professional development. In addition to their technical studies, students learn to communicate their ideas clearly and to conduct themselves in an ethical and socially responsible manner.

Program Educational Objectives

Program educational objectives are broad statements that describe what graduates are expected to attain within a few years of graduation. These objectives are based on the needs of the program's constituencies.

Within a few years of graduation, graduates of the BSME program are expected to do the following:

- Engage in professional practice and/or advanced study
- Further their knowledge and skills through education and/or professional development
- Serve society by using and communicating their knowledge and values

Student Outcomes

The Mechanical Engineering program has the following student outcomes that describe what students are expected to know and be able to do by the time of graduation. These relate to the knowledge, skills and behaviors that students acquire as they progress through the program.

The student outcomes of the BSME program are as follows:

- An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics
- An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
- An ability to communicate effectively with a range of audiences
- An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental and societal contexts
- An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
- An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
- An ability to acquire and apply new knowledge as needed, using appropriate learning strategies

Curriculum

The curriculum is a four-year program leading to the first professional degree, the BSME, and it is accredited by the Engineering Accreditation Commission of ABET under the Commission's General Criteria and Program Criteria for Mechanical Engineering. The curriculum prepares the student for professional practice or postgraduate education in a broad spectrum of mechanical and other engineering or professional fields. It provides critical knowledge in solid mechanics, fluid mechanics, thermodynamics and heat transfer, materials science, dynamics and control, and design. It includes 34 units of mathematics and basic sciences, 58 units of engineering topics, and 28 units of general education for a total degree requirement of 120 units. The general education requirement includes 18 units of social science and humanities.

Core courses must be taken for credit (i.e., for a grade). The social science and humanities courses may be taken on a pass/fail basis. The undergraduate program provides the necessary foundations in these areas and the opportunity to specialize in topics of particular interest. Specialization is accomplished via the judicious choice of engineering electives taken as 300-, 400- or 500-level courses approved by the student's advisor. At the end of the four-year program, the student is ready to go on to graduate education or into research or professional practice.

Basic Core Courses

Humanities, Social Sciences and Writing

Code	Title	Units
Humanities and social sciences (refer to McKelvey School of Engineering degree requirements for details)		18
Engr 310	Technical Writing	3
Free elective		3
Total Units		**24**

Mathematics and Basic Science

Code	Title	Units
Math 132	Calculus II	3
Math 217	Differential Equations	3
Math 233	Calculus III	3
MEMS 201	Numerical Methods and Matrix Algebra	3
or ESE 318	Engineering Mathematics A	
ESE 319	Engineering Mathematics B	3

ESE 326	Probability and Statistics for Engineering	3
Chem 111A	General Chemistry I	3
or Chem 105	Principles of General Chemistry I	
Chem 151	General Chemistry Laboratory I	2
Physics 191	Physics I	3-4
or Physics 193	Focused Physics I	
Physics 191L	Physics I Laboratory	1
or Physics 193L	Focused Physics I Laboratory	
Physics 192L	Physics II Laboratory	1
Physics 192	Physics II	3-4
or Physics 194	Focused Physics II	
Physical or Life Science (200 level or above natural science course in Biology; Chemistry; Physics; Earth, Environmental, and Planetary Sciences; or Environmental Studies)		3
Total Units		**34-36**

Mechanical Engineering

Code	Title	Units
CSE 131	Introduction to Computer Science	3
MEMS 1001	Machine Shop Practicum	1
MEMS 101	Introduction to Mechanical Engineering and Mechanical Design	2
MEMS 2000	Introduction to Electrical and Electronic Circuits for Mechanical Engineering	3
MEMS 202	Computer-Aided Design	2
MEMS 205	Mechanics and Materials Science Laboratory	2
MEMS 253	Statics and Mechanics of Materials	3
MEMS 255	Dynamics	3
MEMS 301	Thermodynamics	3
MEMS 305	Fluid Mechanics and Heat Transfer Laboratory	2
MEMS 3110	Machine Elements	3
MEMS 3410	Fluid Mechanics	3
MEMS 3420	Heat Transfer	3
MEMS 350	Solid Mechanics	3
MEMS 3610	Materials Science	3
MEMS 4050	Vibrations Lab *	2
MEMS 411	Mechanical Engineering Design Project	3
MEMS 412	Design of Thermal Systems	3
MEMS 4301	Modeling, Simulation and Control	3
MEMS 4310	Vibrations	3
MEMS senior electives		9
Total Units		**62**

* MEMS 4050 will increase to 2 units in Fall 2026.